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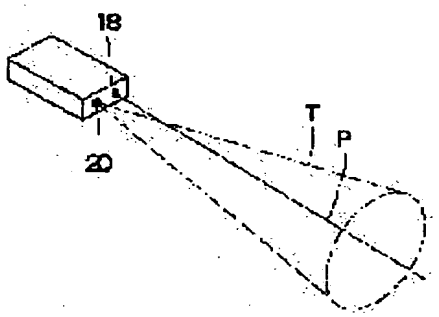
(54) RADIO COMMUNICATION EQUIPMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To visually confirm the irradiated region of a transmission light beam and to easily judge the target object is within a transmission enable position.
SOLUTION: On the front face of an equipment housing, an infrared transmission part 20 having an infrared irradiated region T and a visible light emitting part 18 having a visible light optical axis P passing through the center of the infrared irradiated region T are arranged. The infrared irradiated region T can not be seen by the eyes but the visible light optical axis P can be recognized by the eyes, and by moving a present equipment housing so that the infrared reception part of opposite equipment matches the visible light optical axis P, the infrared reception part of opposite equipment can be brought into the infrared irradiated region T.



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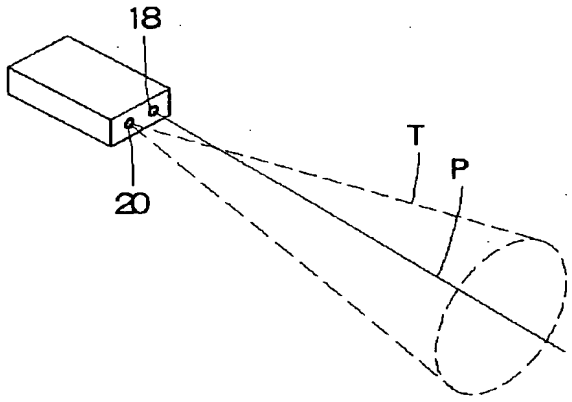
(54)【発明の名称】　無線通信装置

(57)【要約】

【眼的】　送信光ビームの照射領域を眼で確認して送信可能な位置にあることを容易に判断できる。

【構成】　装置筐体の前面には、赤外線照射領域Ｔを有する赤外線送信部２０と赤外線照射領域Ｔの中心を通る可視光光軸Ｐを有する可視光発光部１８とが配置されている。赤外線照射領域Ｔは眼に見えないが、可視光光軸Ｐは眼で認識でき、可視光光軸Ｐを相手装置の赤外線受信部に当てるように自装置筐体を動かすことにより、相手装置の赤外線受信部を赤外線照射領域Ｔ内に入れることができる。



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【特許請求の範囲】

【請求項１】　電磁波や赤外線等の不可視光を媒体として通信を行う無線通信装置において、前記不可視光を送信する送信手段と、前記不可視光の照射領域を表示する可視光を発光する発光手段とを設けたことを特徴とする無線通信装置。

【請求項２】　前記不可視光の照射領域の中心を前記可視光の光軸が通るようにした請求項１に記載の無線通信装置。

【請求項３】　前記可視光は操作部からの要求により発光するようにした請求項１に記載の無線通信装置。

【請求項４】　前記可視光は前記不可視光の送信時に自動的に発光するようにした請求項１に記載の無線通信装置。

【請求項５】　前記可視光は前記不可視光と略同じ照射領域を照射するようにした請求項１に記載の無線通信装置。

【請求項６】　前記不可視光の照射領域を表示する複数の可視光を発光するようにした請求項１に記載の無線通信装置。

【発明の詳細な説明】

【０００１】

【発明の属する利用分野】本発明は、電磁波や光等を媒体として空間的に離れた装置間の通信を行う無線通信装置に関するものである。

【０００２】

【従来の技術】従来から、コンピュータやその周辺機器を接続する手段として、接続用のケーブルを必要としないワイヤレス化を比較的安価に実現できる光空間伝送が注目されている。特に最近では、赤外線光空間伝送の規格化が進められており、１１５Ｋｂｐｓまでの伝送速度を有する物理レイヤの規格及びプロトコルが作成されている。この現在の規格においては、変調方式にはＲＺ符号が採用され、通信距離は１ｍ以内とされているが、将来的には数Ｍｂｐｓまでの伝送速度の規格化が予定されている。

【０００３】図１３は従来例の光無線通信の説明図であり、１台の通信装置１が複数台の通信装置２、３の何れかと通信する場合を示している。送信光ビームの光軸Ｏを有する通信装置１は、光軸Ｏから±１５°の範囲が照射領域Ｌとなっており、通信装置２は通信装置１が送信する光ビームの照射領域が±１５°の内側にあるので、通信装置１は通信装置２に送信することができる。一方、通信装置３は通信装置１が送信する光ビームの照射領域が±１５°の外側にあるので、通信装置１は通信装置３に送信することはできない。

【０００４】

【発明が解決しようとする課題】しかしながら上述の従来例においては、電磁波や赤外線等の不可視光では、無線通信装置が送信する光ビームの照射領域を眼で確認することが不可能なので、相手側の無線通信装置が送信可能な位置にあるかを容易に判断することができないという問題点がある。

【０００５】本発明の目的は、上述の問題点を解消し、送信する光ビームの照射領域を眼で確認して、送信可能な位置にあることを容易に判断できる無線通信装置を提供することにある。

【０００６】

【課題を解決するための手段】上記目的を達成するための本発明に係る無線通信装置は、電磁波や赤外線等の不可視光を媒体として通信を行う無線通信装置において、前記不可視光を送信する送信手段と、前記不可視光の照射領域を表示する可視光を発光する発光手段とを設けたことを特徴とする。

【０００７】

【発明の実施の形態】本発明を図１～図１２に図示の実施例に基づいて詳細に説明する。図１は第１の実施例のブロック回路構成図を示し、バス１０の入出力端には、本装置全体を制御するＣＰＵ１１、ＣＰＵ１１で実行されるプログラムを格納するＲＯＭ１２、ＣＰＵ１１で使用されるデータを格納するＲＡＭ１３、ＣＰＵ１１で使用されるファイルを格納する磁気ディスク等から成る外部記憶装置１４、本装置の操作を行うためのキーボード、マウス等から成る操作部１５、ＣＲＴやＬＣＤ等から成る表示部１６、バス１０に対してシリアルデータチャンネルを提供するＵＡＲＴ（Universal Asynchronous Receiver/Transmitter）１７、可視光を発光するレーザーダイオードとそのドライバ等から成る可視光発光部１８が接続されている。

【０００８】ＵＡＲＴ１７は変調部１９を介して赤外線を送信するＬＥＤとそのドライバ等から成る赤外線送信部２０に接続され、また信号を変換する復調部２１を介して赤外線を受信する光電検出器とそのドライバ等から成る赤外線受信部２２に接続されている。

【０００９】図２は可視光発光部１８の動作説明図であり、装置筐体の前面には、赤外線照射領域Ｔを有する赤外線送信部２０と、可視光光軸Ｐを有する可視光発光部１８が配置されている。ここで、可視光光軸Ｐは赤外線照射領域Ｔの中心を通っている。赤外線照射領域Ｔは眼に見えないが可視光光軸Ｐは眼で認識でき、可視光光軸Ｐを相手装置の赤外線受信部に当てるように自装置の筐体を動かすことにより、相手装置の赤外線受信部を赤外線照射領域Ｔ内に入れることができるようになっている。

【００１０】図３はＲＯＭ１２に格納されたプログラムの内、可視光発光部１８の動作のフローチャート図を示し、このフローはタイマにより繰り返し実行されるか、又はアイドル処理中に繰り返し実行される。

【００１１】ステップＳ１で、可視光発光部１８が発光中のときはステップＳ２に進み、発光中でないときはステッ

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ブS4に進む。なお、可視光発光部１８が発光していることは、可視光発光部１８の状態レジスタを読み込むことや、可視光発光部１８を起動したときにセットするＲＡＭ１３中の可視光状態フラグを読み込むことで検知する。

【００１２】ステップS2で操作部１５から発光停止要求があったときはステップS3に進み、ステップS3で可視光発光部１８の発光を停止し、発光停止要求がないときはそのまま終了する。ステップS4で、操作部１５から発光開始要求があったときはステップS5に進み、ステップS5で可視光発光部１８の発光を開始する。ここでは、操作部１５において釦の押し下げやコマンドの入力などにより、発光開始要求があるときだけ可視光発光部１８が発光し、発光開始要求がないときはそのまま終了する。

【００１３】図４は第２の実施例の可視光発光部１８の動作のフローチャート図を示し、第１の実施例では操作部１５から発光開始要求があったときに可視光発光部１８を発光しているが、本実施例では赤外線送信部２０が送信中に自動的に可視光発光部１８が発光するようにし、この場合のフローもタイマにより繰り返し実行されるか、又はアイドル処理中に繰り返し実行される。

【００１４】ステップS11 で、可視光発光部１８が発光中のときはステップS11 に進み、発光中でないときはステップS13 に進む。なお、このとき可視光発光部１８が発光していることは、可視光発光部１８の状態レジスタを読み込むことや、可視光発光部１８を起動したときにセットするＲＡＭ１３中の可視光状態フラグを読み込むことで検知する。

【００１５】ステップS11 で、赤外線送信部２０が送信中のときは終了し、送信中でないときはステップS12 に進み、可視光発光部１８の発光を停止する。なお、赤外線送信部２０が送信していることは、赤外線送信部２０の状態レジスタを読み込むことや、赤外線送信部２０を起動したときにセットするＲＡＭ１３中の赤外線状態フラグを読み込むことで検知する。ステップS13 で、赤外線送信部２０が送信中でないときは終了し、送信中のときはステップS14 に進み、ステップS14 で可視光発光部１８の発光を開始する。

【００１６】図５は第３の実施例の動作説明図を示し、第１の実施例では可視光光軸Ｐは赤外線照射領域Ｔの中心を通るようにしていたが、本実施例では赤外線照射領域Ｔと同じ領域を可視光で照射するようにしている。装置筐体の前面には赤外線送信部１８’及び可視光発光部２０’が配置されており、可視光照射領域R1は赤外線照射領域R2とほぼ重なる。可視光照射領域R1を相手装置の赤外線受信部に当てるように装置筐体を動かすことで、相手装置の赤外線受信部を赤外線照射領域R2の中に入れることができる。

【００１７】可視光照射領域R1を有する光源は、電球の光を凸レンズや凹面鏡などで集光することにより実施でき、図６は電球３１、凸レンズ３２から成る可視光照射領域R1を有する光源であり、図７は電球３３、凹面鏡３４から成る可視光照射領域R1を有する光源である。更に、電球３１、３３の代りにＬＥＤなどを用いてもよい。

【００１８】図８は第４の実施例のブロック回路構成図であり、例えば４個～８個のレーザーダイオードとそのドライバから成る可視光発光部１８がバス１０に接続されており、図１と同じ符号は同じ部材を表している。

【００１９】図９～図１２は赤外線照射領域Ｍと複数の可視光光軸Ｎとの関係を示し、図９では４個の可視光光軸Ｎが赤外線照射領域Ｍの上下左右の端を通るようにされており、図１０では８個の可視光光軸Ｎが赤外線照射領域Ｍの周辺を通るようにされている。また、図１１では５個の可視光光軸Ｎが赤外線照射領域Ｍの中心と上下左右の端を通るようにされ、図１２では４個の可視光光軸Ｎが赤外線照射領域Ｍを囲む正方形の角を通るようにされている。

【００２０】なお、可視光発光部１８は電球又はＬＥＤ等の光を凸レンズや凹面鏡などで細い光に集光することによっても実施でき、その数は任意に選択できる。

【００２１】

【発明の効果】以上説明したように本発明に係る無線通信装置は、不可視光の照射領域を表示する可視光を発光する手段を設けることにより、無線通信装置が送信する不可視光の照射領域を目視で確認できるようにしたので、相手の無線通信装置と送信可能な位置にあるか否かを容易に判断することができる。

【図面の簡単な説明】

【図１】第１の実施例のブロック回路構成図である。

【図２】可視光発光部の動作説明図である。

【図３】フローチャート図である。

【図４】第２の実施例のフローチャート図である。

【図５】第３の実施例の可視光発光部の動作説明図である。

【図６】レンズによる可視光照射領域を有する光源の説明図である。

【図７】凹面鏡による可視光照射領域を有する光源の説明図である。

【図８】第４の実施例のブロック回路構成図である。

【図９】赤外線照射領域と複数の可視光光軸の説明図である。

【図１０】赤外線照射領域と複数の可視光光軸の説明図である。

【図１１】赤外線照射領域と複数の可視光光軸の説明図である。

【図１２】赤外線照射領域と複数の可視光光軸の説明図である。

【図１３】従来例の複数の装置による通信の説明図である。

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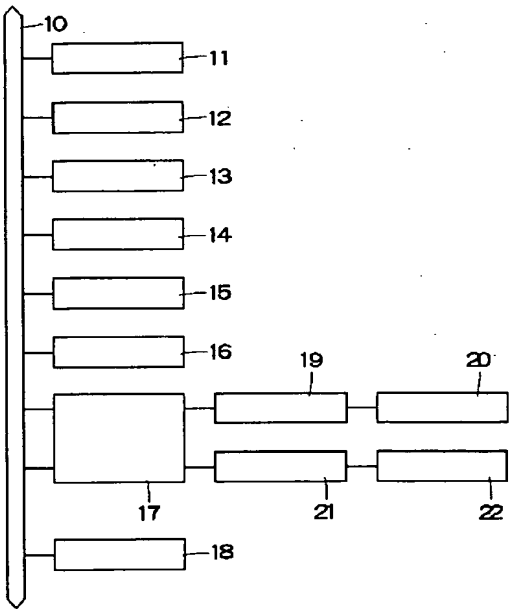
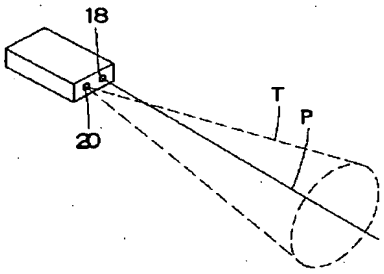
【符号の説明】

１０　バス
１１　ＣＰＵ
１２　ＲＯＭ
１３　ＲＡＭ
１４　外部記憶装置
＊１５　操作部
１６　表示部
１７　ＵＡＲＴ
１８　可視光発光部
２０　赤外線送信部
＊　２２　赤外線受信部

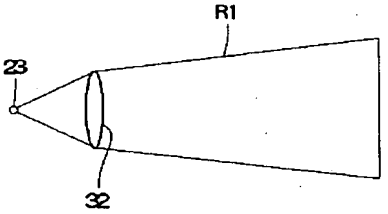
【図１】



【図２】



【図６】



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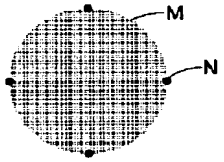
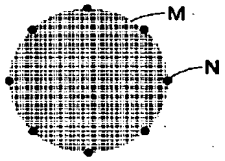
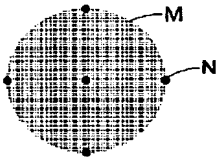


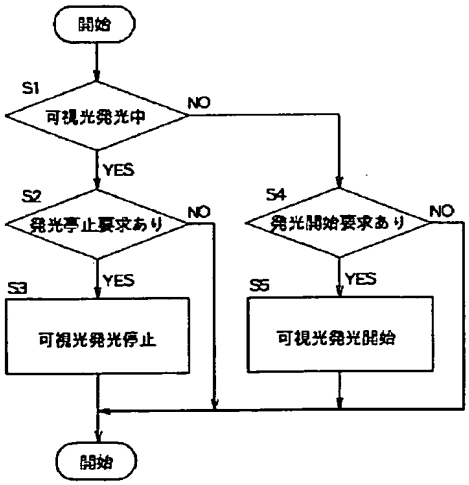
【図１０】



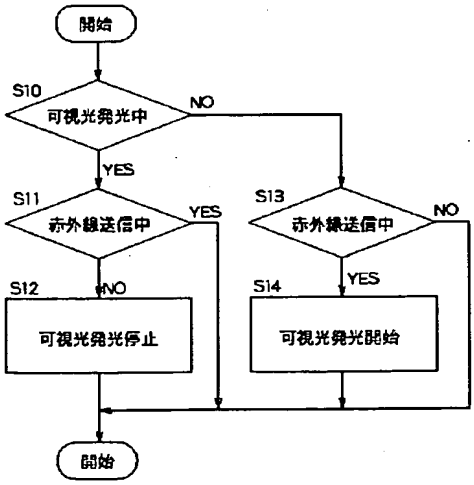
【図１１】



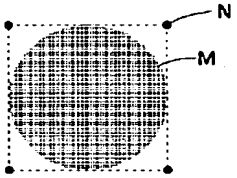
【図３】



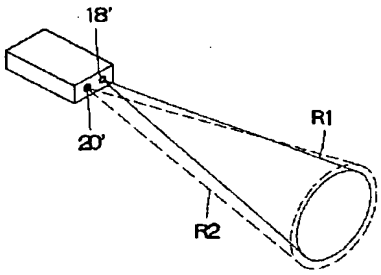
【図４】



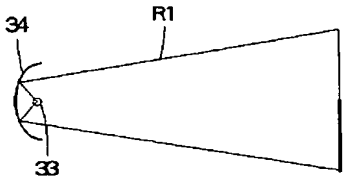
【図１２】



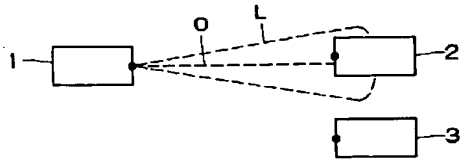
【図5】


18'
20'
R1
R2

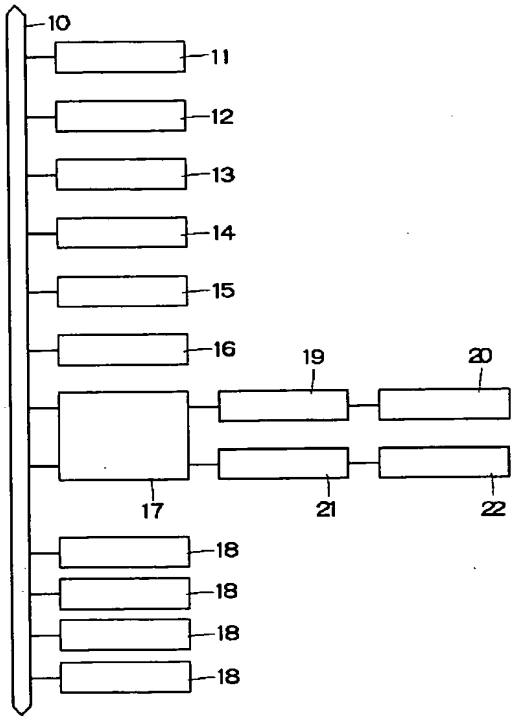
【図7】


34
R1
33

【図13】


1
O
L
2
3

【図8】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CLAIMS

[Claim(s)]
[Claim 1] The radio communication equipment characterized by establishing a transmitting means to transmit said invisible light, and a luminescence means to emit light in the light which displays the exposure field of said invisible light, in the radio communication equipment which communicates through invisible light, such as an electromagnetic wave and infrared radiation.
[Claim 2] The radio communication equipment according to claim 1 with which the optical axis of said light passed along the core of the exposure field of said invisible light.
[Claim 3] Said light is the radio communication equipment according to claim 1 it was made to emit light by the demand from a control unit.
[Claim 4] Said light is the radio communication equipment according to claim 1 it was made to emit light automatically at the time of transmission of said invisible light.
[Claim 5] said light -- said invisible light and abbreviation -- the radio communication equipment according to claim 1 it was made to irradiate the same exposure field.
[Claim 6] The radio communication equipment according to claim 1 two or more lights which display the exposure field of said invisible light were made to emit light.

[Translation done.]
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The field of the invention to which invention belongs] This invention relates to the radio communication equipment which performs the communication link between the equipment which left an electromagnetic wave, light, etc. spatially as a medium.
[0002]
[Description of the Prior Art] From the former, optical space transmission which can realize comparatively cheaply wireless-ization which does not need the cable for connection attracts attention as a means to connect a computer and its peripheral device. Recently standardization of infrared light space transmission is especially advanced, and the specification and the protocol of the physical layer which has the transmission speed to 115Kbps are created. In this current specification, although an RZ code is adopted as a modulation technique and the communication range is set to less than 1m, standardization of the transmission speed to Number Mbps is planned in the future.
[0003] Drawing 13 is the explanatory view of the optical radio of the conventional example, and shows the case where one communication device 1 communicates with any of two or more communication devices 2 and 3 they are. The range of **15 degrees serves as the exposure field L

from the optical axis O, and since a communication device 2 has the exposure field of the light beam which a communication device 1 transmits in the inside which is **15 degrees, the communication device 1 which has the optical axis O of a transmitting light beam can transmit a communication device 1 to a communication device 2. On the other hand, since a communication device 3 has the exposure field of the light beam which a communication device 1 transmits in the outside which is **15 degrees, a communication device 1 cannot be transmitted to a communication device 3.
[0004]
[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional example, with invisible light, such as an electromagnetic wave and infrared radiation, since it is impossible to check the exposure field of the light beam which a radio communication equipment transmits by the eye, there is a trouble that it cannot judge easily whether it is in the location which can transmit the radio communication equipment of the other party.
[0005] The purpose of this invention is to offer the radio communication equipment which can judge easily that the exposure field of the light beam which cancels an above-mentioned trouble and transmits is checked by the eye, and it is in the location which can be transmitted.
[0006]
[Means for Solving the Problem] The radio communication equipment concerning this invention for attaining the above-mentioned purpose is characterized by establishing a transmitting means to transmit said invisible light, and a luminescence means to emit light in the light which displays the exposure field of said invisible light in the radio communication equipment which communicates through invisible light, such as an electromagnetic wave and infrared radiation.
[0007]
[Embodiment of the Invention] This invention is explained to drawing 1 - drawing 12 at a detail based on the example of illustration. Drawing 1 shows the block circuitry Fig. of the 1st example. In the I/O edge of a bus 10 This whole equipment The keyboard for performing actuation of the external storage 14 which consists of the magnetic disk which stores the file used by RAM13 and CPU11 which store the data used by ROM12 and CPU11 which store the program performed by CPU11 and CPU11 to control, and this equipment, As opposed to the display 16 and bus 10 which consist of the control unit 15 and CRT which consist of a mouse etc., LCD, etc. The light light-emitting part 18 which consists of the driver etc. is connected with UART (Universal Asynchronous Receiver/Transmitter)17 which offers a serial data channel, and the laser diode which emits light in the light.
[0008] UART17 is connected with the photodetector which receives infrared radiation through the recovery section 21 which is connected to the infrared transmitting section 20 which consists of LED which transmits infrared radiation through the modulation section 19, its driver, etc., and changes a signal in the infrared receive section 22 which consists of the driver etc.
[0009] Drawing 2 is the explanatory view of the light light-emitting part 18 of operation, and the infrared transmitting section 20 which has the infrared exposure field T, and the light light-emitting part 18 which has the light optical axis P are arranged in the front face of an equipment case. Here, the light optical axis P passes along the core of the infrared exposure field T. Although the infrared exposure field T is not visible to an eye, the light optical axis P can be recognized by the eye, and the infrared receive section of partner equipment can be put in in the infrared exposure field T by moving the case of self-equipment so that the light optical axis P may be applied to the infrared receive section of partner equipment.
[0010] Drawing 3 shows the flow chart Fig. of actuation of the light light-emitting part 18 among the programs stored in ROM12, and this flow is repeatedly performed by the timer, or is repeatedly performed during idle processing.
[0011] At step S1, while the light light-emitting part 18 is emitting light, it progresses to step S2, and when it is not under luminescence, it progresses to step S4. In addition, that the light light-emitting part 18 is emitting light detects by reading the status register of the light light-emitting part 18, or reading the light status flag in RAM13 set when the light light-emitting part 18 is started.
[0012] When there is a luminescence deactivate request from a control unit 15 at step S2, it

progresses to step S3, luminescence of the light light-emitting part 18 is stopped at step S3, and when there is no luminescence deactivate request, it ends as it is. By step S4, when there is a luminescence initiation demand from a control unit 15, it progresses to step S5, and luminescence of the light light-emitting part 18 is started at step S5. Here, only when there is a luminescence initiation demand by depression of **, the input of a command, etc. in a control unit 15, the light light-emitting part 18 emits light, and when there is no luminescence initiation demand, it ends as it is.

[0013] Although light is emitted in the light light-emitting part 18 when drawing 4 shows the flow chart Fig. of actuation of the light light-emitting part 18 of the 2nd example and there is a luminescence initiation demand from a control unit 15 in the 1st example, it is made for the light light-emitting part 18 to emit light automatically [while the infrared transmitting section 20 transmits] at this example, and the flow in this case is also repeatedly performed by the timer, or it performs repeatedly during idle processing.

[0014] Step S11 While the light light-emitting part 18 is emitting light, it is step S11. When it progresses and is not under luminescence, it is step S13. It progresses. In addition, that the light light-emitting part 18 is emitting light at this time detects by reading the status register of the light light-emitting part 18, or reading the light status flag in RAM13 set when the light light-emitting part 18 is started.

[0015] Step S11 When it ends while the infrared transmitting section 20 is transmitting, and it is not under transmission, it is step S12. It progresses and luminescence of the light light-emitting part 18 is stopped. In addition, that the infrared transmitting section 20 has transmitted detects by reading the status register of the infrared transmitting section 20, or reading the infrared status flag in RAM13 set when the infrared transmitting section 20 is started. Step S13 When it ends while the infrared transmitting section 20 is not transmitting, and it is under transmission, it is step S14. It is step S14 spontaneously. Luminescence of the light light-emitting part 18 is started.

[0016] Although drawing 5 shows the explanatory view of the 3rd example of operation and he was trying for the light optical axis P to pass along the core of the infrared exposure field T by the 1st example, he is trying to irradiate the same field as the infrared exposure field T by the light at this example. In the front face of an equipment case, infrared transmitting section 18' and light light-emitting part 20' are arranged, and the light exposure field R1 laps with the infrared exposure field R2 mostly. By moving an equipment case so that the light exposure field R1 may be applied to the infrared receive section of partner equipment, the infrared receive section of partner equipment can be put in into the infrared exposure field R2.

[0017] The light source which has the light exposure field R1 can be carried out by condensing the light of an electric bulb with a convex lens, a concave mirror, etc., drawing 6 is the light source which has the light exposure field R1 which consists of an electric bulb 31 and a convex lens 32, and drawing 7 is the light source which has the light exposure field R1 which consists of an electric bulb 33 and a concave mirror 34. Furthermore, LED etc. may be used instead of electric bulbs 31 and 33.

[0018] Drawing 8 is the block circuitry Fig. of the 4th example, for example, the light light-emitting part 18 which consists of four - eight laser diodes and drivers is connected to the bus 10, and the same sign as drawing 1 expresses the same member.

[0019] The relation between the infrared exposure field M and two or more light opticals axis N is shown, and he is trying, as for drawing 9 - drawing 12 , for four light opticals axis N to pass along the edge of the four directions of the infrared exposure field M by drawing 9 , and is trying for eight light opticals axis N to pass along the circumference of the infrared exposure field M by drawing 10 . Moreover, five light opticals axis N pass along the core of the infrared exposure field M, and an vertical and horizontal edge by drawing 11 , and he is trying to pass along the angle of the square for which four light opticals axis N surround the infrared exposure field M by drawing 12 .

[0020] In addition, the light light-emitting part 18 can be carried out also by condensing light, such as an electric bulb or LED, in a thin light with a convex lens, a concave mirror, etc., and can choose the number as arbitration.

[0021]

[Effect of the Invention] It can judge easily whether since the radio communication equipment applied to this invention as explained above enabled it to check visually the exposure field of the invisible light which a radio communication equipment transmits by establishing a means to emit light in the light which displays the exposure field of invisible light, it is in a partner's radio communication equipment and the location which can be transmitted.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block circuitry Fig. of the 1st example.
[Drawing 2] It is the explanatory view of a light light-emitting part of operation.
[Drawing 3] It is a flow chart Fig.
[Drawing 4] It is the flow chart Fig. of the 2nd example.
[Drawing 5] It is the explanatory view of the light light-emitting part of the 3rd example of operation.
[Drawing 6] It is the explanatory view of the light source which has a light exposure field with a lens.
[Drawing 7] It is the explanatory view of the light source which has a light exposure field by the concave mirror.
[Drawing 8] It is the block circuitry Fig. of the 4th example.
[Drawing 9] It is the explanatory view of an infrared exposure field and two or more light opticals axis.
[Drawing 10] It is the explanatory view of an infrared exposure field and two or more light opticals axis.
[Drawing 11] It is the explanatory view of an infrared exposure field and two or more light opticals axis.
[Drawing 12] It is the explanatory view of an infrared exposure field and two or more light opticals axis.
[Drawing 13] It is the explanatory view of the communication link by two or more equipments of the conventional example.
[Description of Notations]
10 Bus
11 CPU
12 ROM
13 RAM
14 External Storage
15 Control Unit
16 Display
17 UART
18 Light Light-emitting Part
20 Infrared Transmitting Section
22 Infrared Receive Section

[Translation done.]
* NOTICES *

DRAWINGS

[Drawing 1]

[Drawing 2]

[Drawing 3]

[Drawing 4]

[Drawing 6]

[Drawing 9]

[Drawing 10]

[Drawing 11]

[Drawing 12]

[Drawing 5]

[Drawing 7]

[Drawing 8]

[Drawing 13]

[Translation done.]